इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 6210 (1979): Method of test for stress relaxation of gasket materials (to be withdrawn) [MED 30: Gaskets and Packing]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

UDC 621-762·4 : 620·172·21 (First Reprint MARCH 1989) IS : 6210 - 1979

Indian Standard

(Reaffirmed 1999)

METHOD OF TEST FOR STRESS RELAXATION OF GASKET MATERIAL

(First Revision)

1. Scope — Provides a method of measuring the amount of stress relaxation of a gasket material at a stated time and temperature after a compressive stress has been applied.

2. Apparatus — The general arrangement and details of the apparatus are given in Fig. 1 and 2.

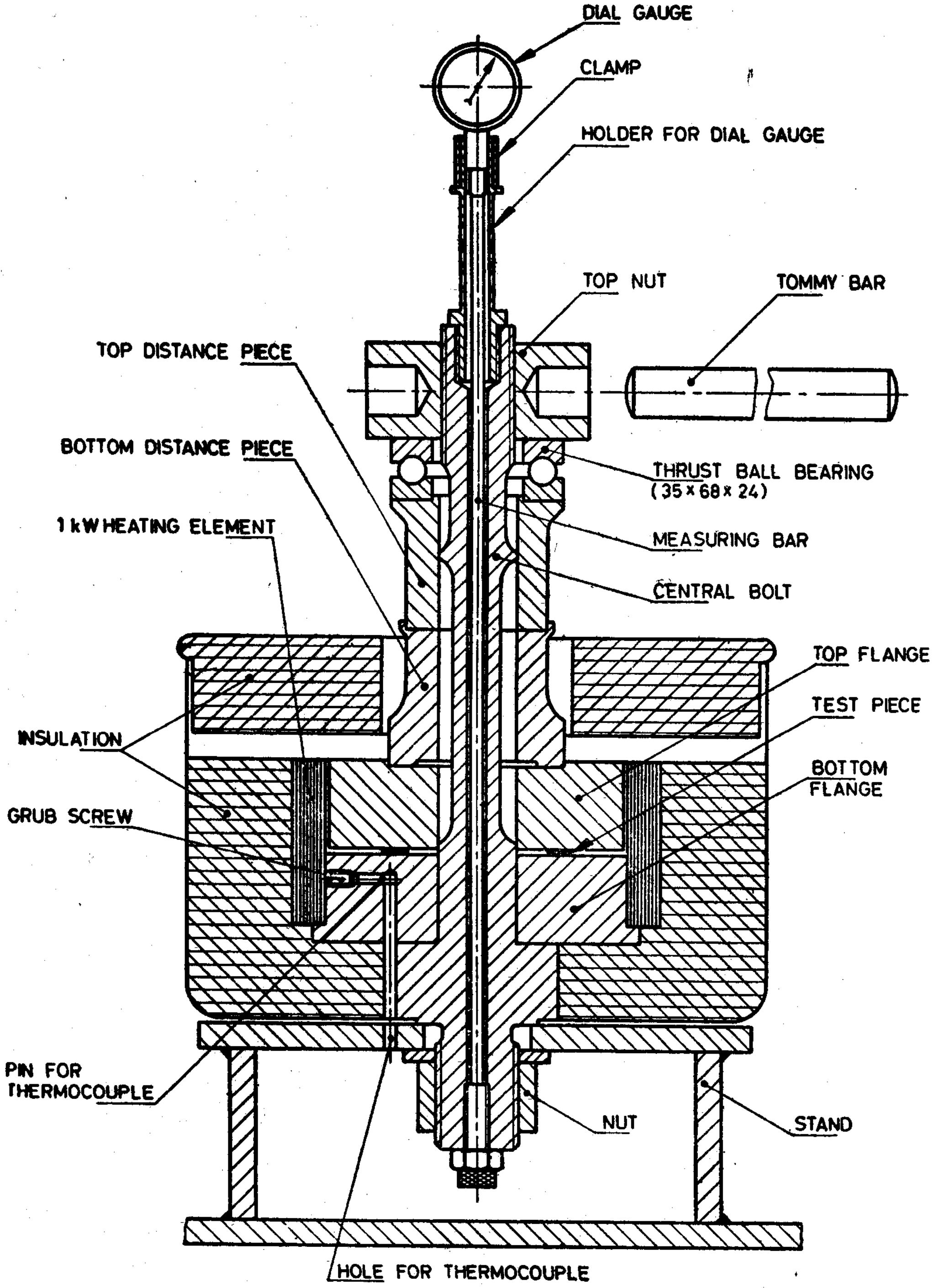
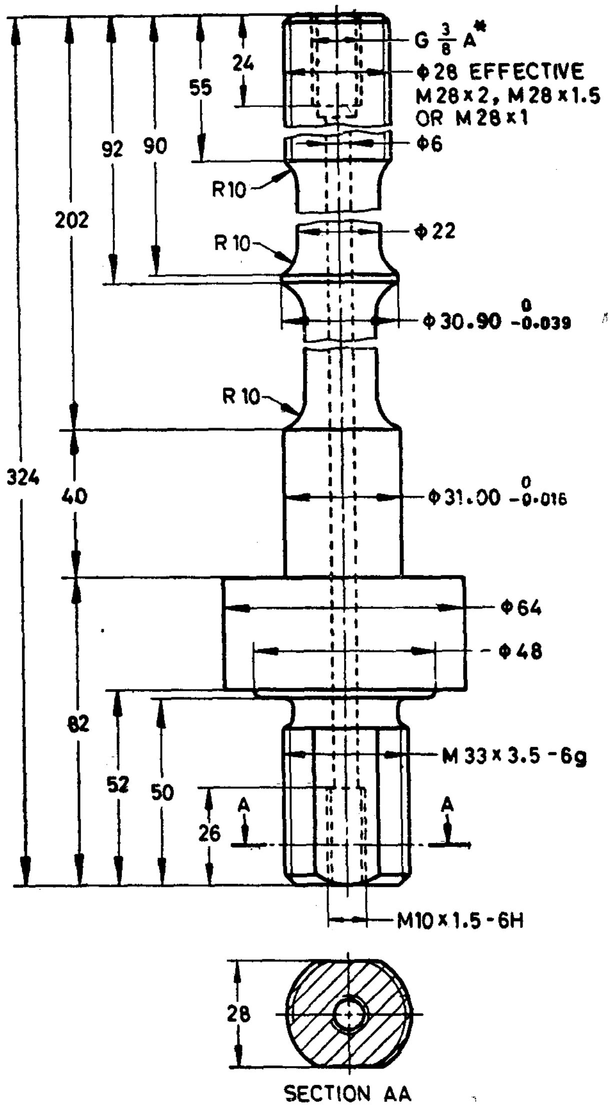


FIG. 1 GENERAL ASSEMBLY OF STRESS RELAXATION TESTING MACHINE

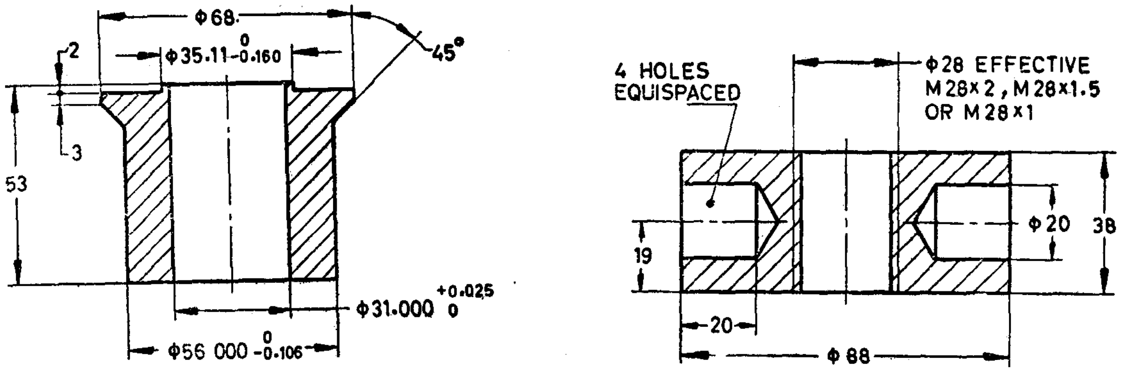
Gaskets and Packings Sectional Committee, EDC 58; Gaskets for Automobiles Subcommittee, EDC 58 : 2 [Ref : Doc : EDC 58 (3047)]

Adopted 27 September 1979 © March 1980, BIS Gr 5

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002



2A Central Bolt with Bottom Flange Support

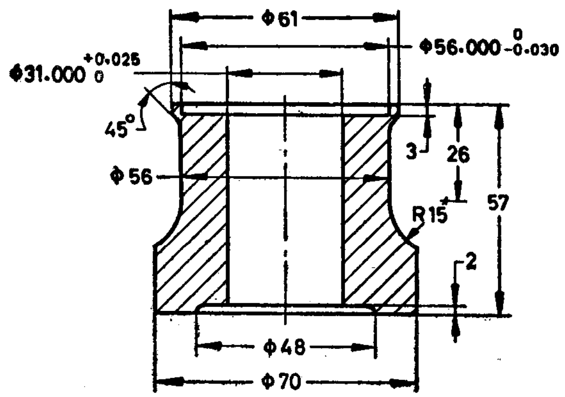


2B Top Distance Piece

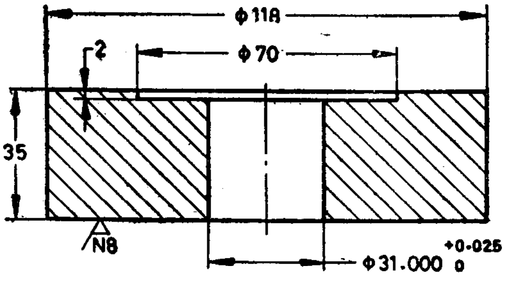
2C Top Nut

*IS : 2643 Dimensions for pipe threads for fastening purposes (*issued in various parts*).

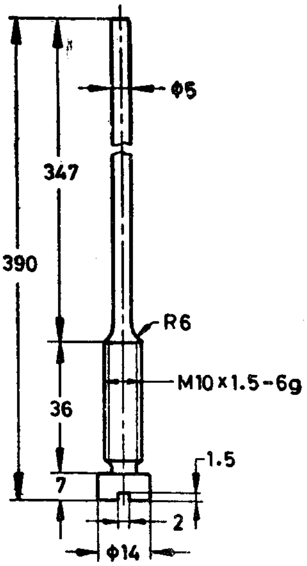
FIG. 2 DETAILS OF COMPONENTS OF STRESS RELAXATION TESTING MACHINE — *Contd*



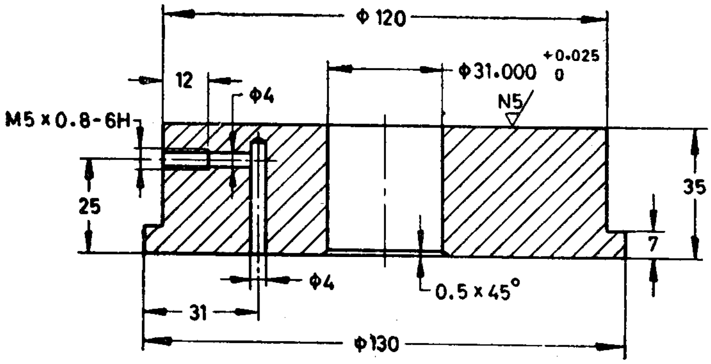
2D Bottom Distance Piece



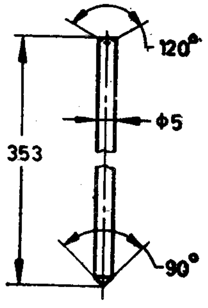
2E Top Flange



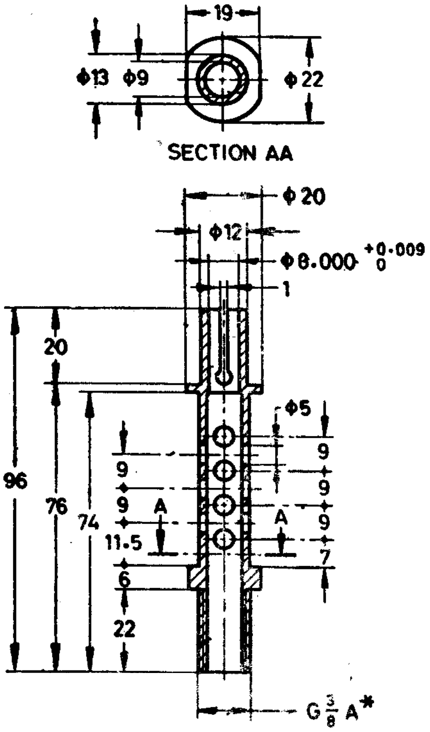
2G Measuring Bar (Solid Type)



2F Bottom Flange

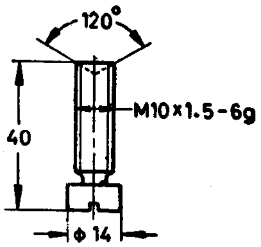


2H Measuring Bar (Floating Type)



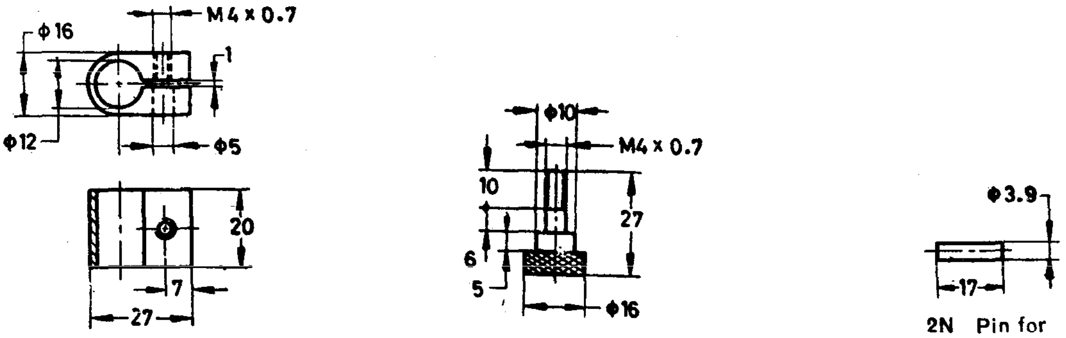
*See IS : 2643

2K Holder for Dial Gauge



2J Medium

FIG. 2 DETAILS OF COMPONENTS OF STRESS RELAXATION TESTING MACHINE — *Contd*



2L Clamp

2M Clamp Screw

2N Pin for Thermocouple

All dimensions in millimetres.

FIG. 2 DETAILS OF COMPONENTS OF STRESS RELAXATION TESTING MACHINE

2.1 The central bolt and bottom flange support shall be in one piece and made of steel alloy conforming to IS : 4368-1967 ' Specification for alloy steel billets, blooms and slabs for forgings for general engineering purposes ' and heat treated to give a hardness of 300 to 340 *HV*. The hardness shall be measured on the 22 mm diameter section of the bolt. The preferred diameter of the central portion of the loading bolt is 19 mm, but the dimension can be adjusted in order to ensure that the required relationship exists between stress and bolt extension.

2.2 The top and bottom distance pieces, top nut, top and bottom flanges, holder for dial gauge and clamps shall be made of steel conforming to IS : 5517-1969 'Specification for steel for hardening and tempering'. The measuring bars (solid or floating type) and the pin for thermocouple shall be made of bright bars conforming to IS : 7270-1974 'Specification for bright bars (standard quality)'.

2.3 The thermocouple junction is to be firmly pressed against the end of the thermocouple hole.

2.4 The top and bottom flanges should be enclosed all round by a 1 kW heating element, suitably controlled to give a uniform temperature rise from room temperature to 300°C in one hour and to hold the temperature within ±5°C of this uniform rate at any time, as well as maintain the test temperature within ±5°C for the test period.

2.5 The elasticity of the machine shall be such that the bolt extension (as given by the dial gauge at the top of the apparatus) required to produce an initial stress of 40 MPa on the gasket, shall not be less than 230 μm and not more than 300 μm.

2.6 The thermal characteristics of the apparatus are to be such that when a steel ring of the same size as the test piece, is used instead of the test piece, the maximum stress is within the limits of 43 to 47 MPa*.

2.7 The apparatus is to be insulated so that the rate of heating or the final temperature is held within the limits specified above and totally unaffected by any change in ambient temperature.

3. Calibration of Apparatus — It is essential that the apparatus is calibrated before use and diagram prepared so that the load applied to the test piece shall be read at different temperatures as a function of the extension of the central bolt. The calibration method shall ensure that the central bolt is loaded in the same manner as occurs when the tests are conducted.

3.1 The method of calibration of the stress relaxation test apparatus is given in Appendix A.

3.2 A typical calibration diagram is given in Fig. 3.

4. Preparation of Test Piece — The test piece shall be cut from 1·5 mm thick jointing sheets. In case of orders for jointing sheets of other thicknesses, the test piece shall be cut from 1·5 mm thick jointing sheet guaranteed by the manufacturer to be of equivalent quality.

4.1 Test piece shall be an annular ring of 75 mm external diameter and 55 mm internal diameter. It should be cut with a die to ensure that there are no burrs on the edges and that the bore and outside diameter are concentric.

---

* 1 MPa = 1 MN/m^2 = 1 N/mm^2.

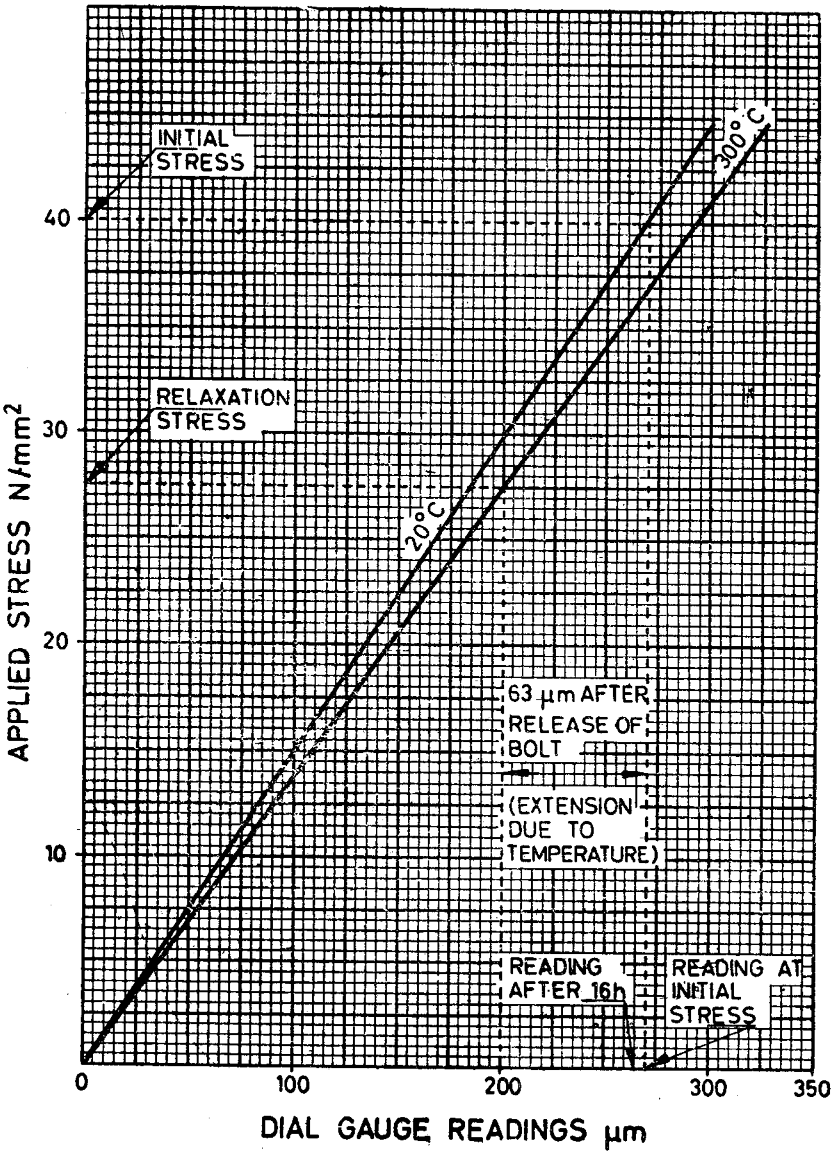


FIG. 3 TYPICAL CALIBRATION CURVE FOR STRESS RELAXATION TESTING MACHINE

5. Procedure — The test piece shall be conditioned in a desiccator containing anhydrous calcium chloride for 48 hours at room temperature immediately prior to the test.

5.1 Rub french chalk or graphite on both sides of the test piece to prevent the test piece from sticking to the top or bottom flanges. If preferred, thin aluminium foil may be placed between the flanges and the test piece.

5.2 Assemble the apparatus with the test piece placed concentrically between the flanges.

5.3 Set the dial gauge to zero.

5.4 Stress the test piece by tightening the nut, without jerking to the initial compressive strength of 40 MPa, that is, by tightening the nut until the dial gauge reading reaches the figure corresponding to 40 MPa on the room temperature curve of the calibration diagram.

5.5 The nut shall be re-tightened after five minutes to the initial compressive stress as in **5.4** to compensate for any relaxation that has occurred.

5.6 Switch the heat on and raise the temperature to 300°C in one hour at a uniform rate within ±5°C as mentioned in **2.4**.

5.7 After the apparatus has reached a stable temperature of 300°C, commence timing of the test.

5.8 Maintain the test temperature of 300°C to within ±5°C for 16 hours.

5.9 At the end of the test period of 16 hours, record the dial gauge reading 'X'.

5.10 Release the tension and record the dial gauge reading 'Y' immediately.

5.11 Switch off the heat.

6. Analysis of Result — The difference between the dial gauge readings at the end of the test before and after releasing the tension is to be taken that is reading 'X'. reading 'Y' and the value read off on the calibration diagram.

6.1 The stress relaxation value shall not be less than the value specified for the material.

APPENDIX A

(*Clause* 3.1)

METHOD OF CALIBRATION OF STRESS RELAXATION APPARATUS

A-1. It is necessary to calibrate the stress relaxation apparatus so as to correlate the load on test piece with the extension of the measuring bar.

A-2. For this purpose the following equipment shall be needed:

a) A loading device with sufficient daylight to allow for the apparatus to be calibrated;

b) Two dial gauges, in addition to the dial gauge of the apparatus;

c) Special discs of mild steel;

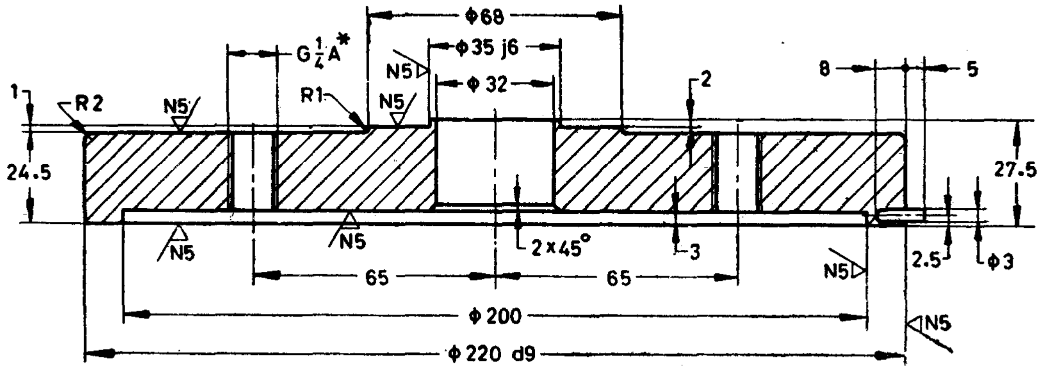
d) Two holders of bright bar steel [conforming to IS : 7270-1974 Specification for bright bars (standard quality)];

e) Two 5 mm diameter rods of bright bars (conforming to IS : 7270-1974);

f) Two clamps with screws of steel (conforming to IS : 5517-1969 Specification for steel for hardening and tempering); and

g) Two special loading ferrules each made of mild steel.

A-2.1 The shape and dimensions of the special discs, holder, rods, clamps and loading ferrules are given in Fig. 4.

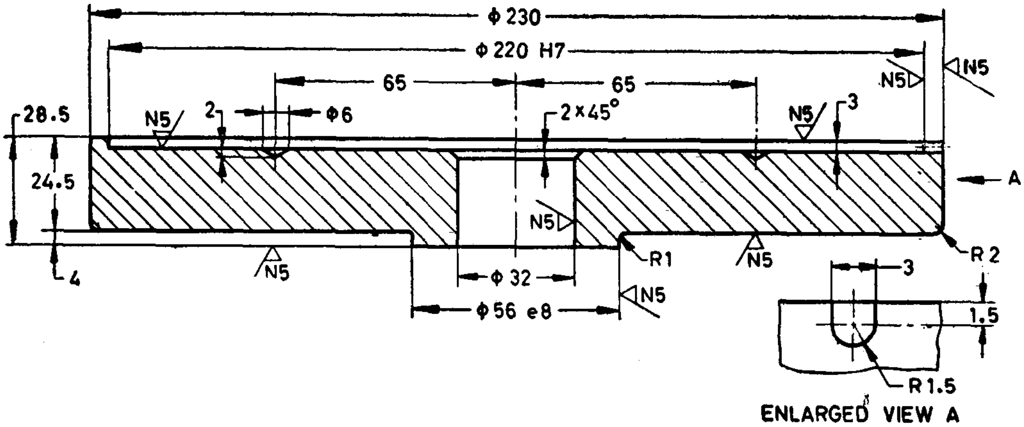


*See IS : 2643.

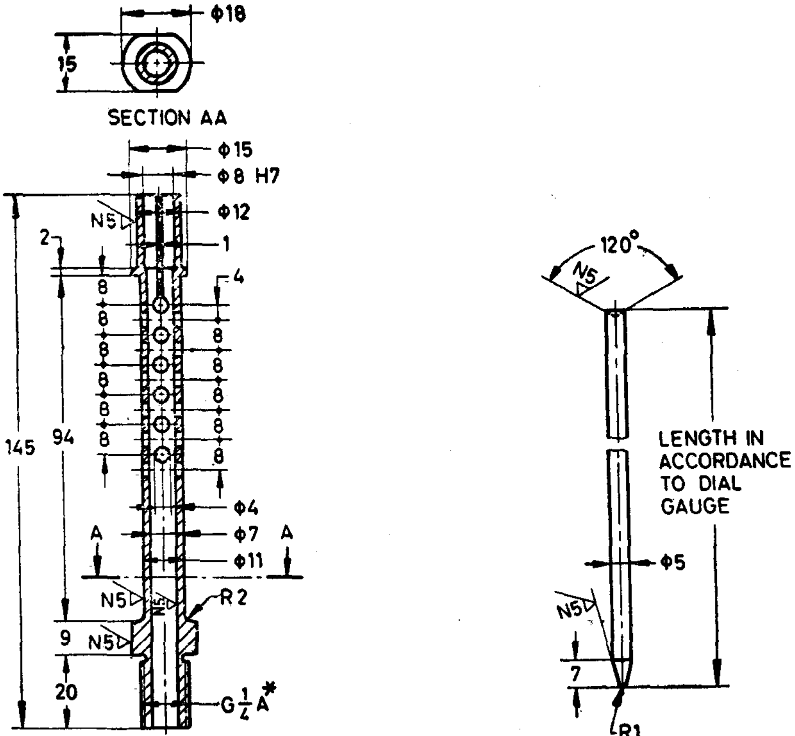
4A Bottom Disc

All dimensions in millimetrers.

FIG. 4 DETAILS OF EQUIPMENTS NEEDED TO CALIBRATE THE STRESS RELAXATION APPARATUS — *Contd*



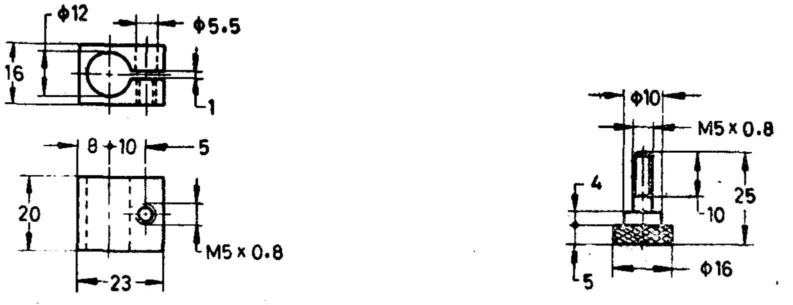
4B Top Disc



*See IS : 2643.

4C Holder

4D Rod

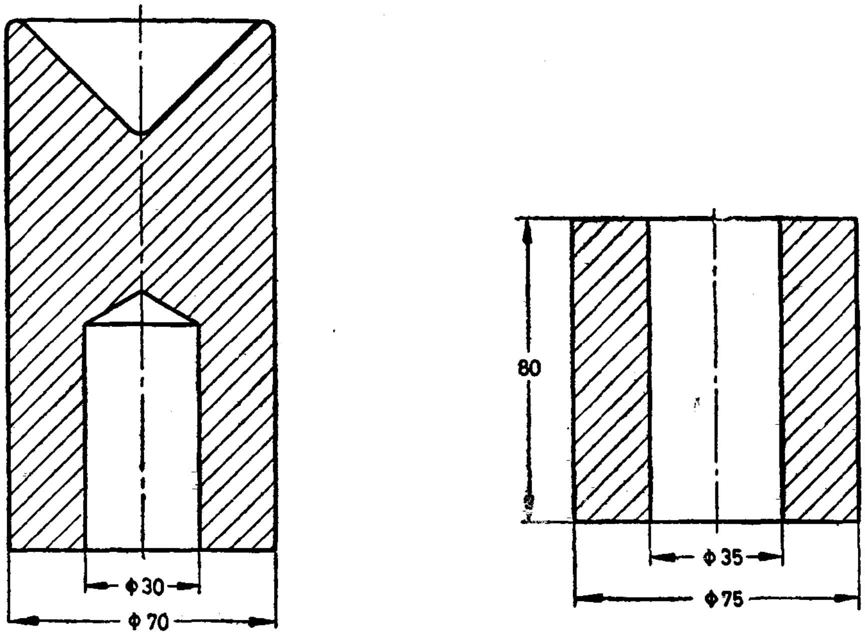


4E Clamp

4F Clamp Screw

All dimensions in millimetres.

FIG. 4 DETAILS OF EQUIPMENTS NEEDED TO CALIBRATE THE STRESS RELAXATION APPARATUS — *Contd*



4G Loading Ferrule

4H Loading Ferrule

All dimensions in millimetres.

FIG. 4 DETAILS OF EQUIPMENTS NEEDED TO CALIBRATE THE STRESS RELAXATION APPARATUS

A-3. Procedure Stage I

A-3.1 Remove the gauge and holder from the stress relaxation apparatus.

A-3.2 Replace top distance piece (*see* Fig. 1) by the special discs complete with holders, clamps and gauges, replace ball thrust bearing, replace top and bottom nuts by special ferrules (*see* Fig. 5).

A-3.3 Place the assembly in the loading device.

A-3.4 Apply loads in suitable increments, at room temperature, up to a maximum of 103 kN.

A-3.5 Record loads against a series of dial gauge readings (at room temperature).

A-3.6 Allow the apparatus to heat up to 300°C and wait for an hour for it to stabilize at this temperature.

A-3.7 Repeat loading as in **A-3.4**.

A-3.8 Record loads against dial gauge readings (at 300°C).

A-4. Procedure Stage II

A-4.1 Remove the assembly from the loading device.

A-4.2 Replace special ferrules by top and bottom nuts (after placing on the stand). Re-fit gauge and holder. The arrangement shall be as shown in Fig. 6.

A-4.3 Apply a series of loads with the top nut, at room temperature to give dial gauge readings already recorded at **A-3.5**.

A-4.4 Record loads against centre bolt dial gauge readings.

A-4.5 Allow the apparatus to heat up to 300°C and proceed as in **A-3.6**, **A-3.7** and **A-3.8**.

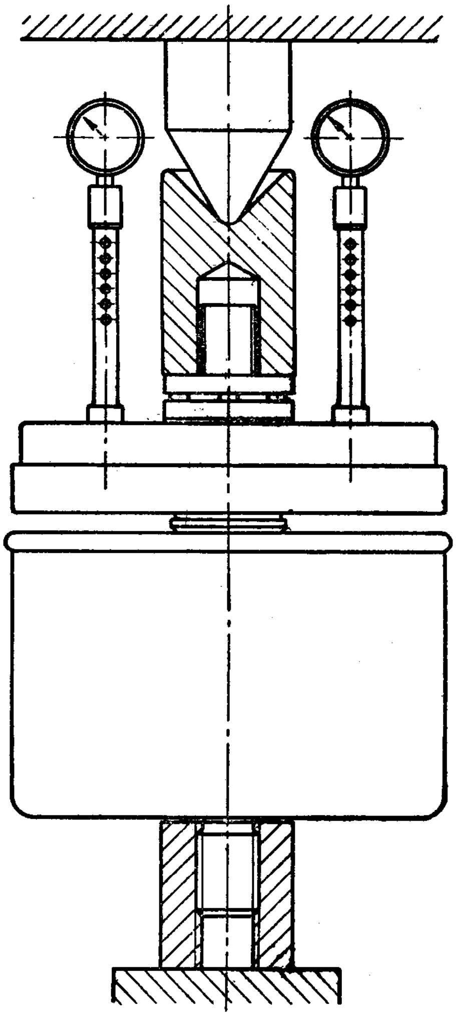


FIG. 5 ARRANGEMENT FOR CLIBRATION OF DYNAMOMETER AT INCREASED TEMPERATURES

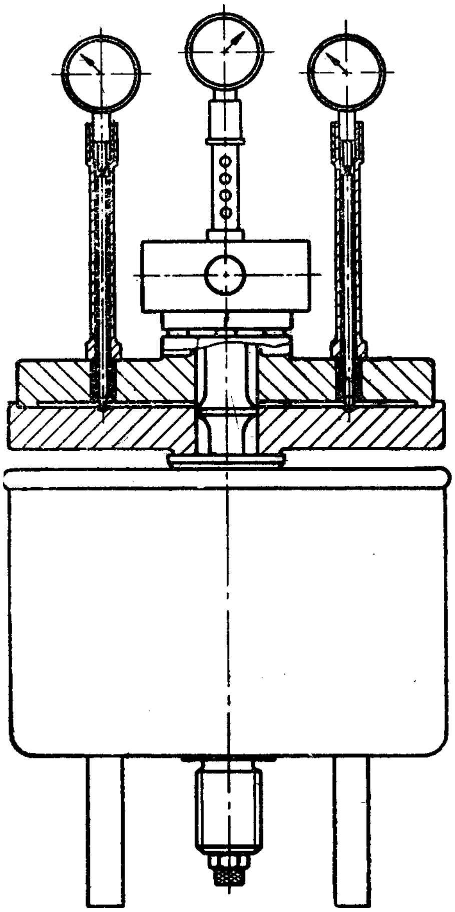


FIG. 6 DYNAMOMETER

A-5. Calibration Curve — From the information obtained in **A-4.4** and **A-4.5** plot the calibration curve, stress against dial gauge readings.

EXPLANATORY NOTE

This standard, first published in 1971, has been revised to make it suitable for high temperature compressed asbestos fibre jointing materials.

Gaskets must have the ability to maintain the stress level applied to the flanged assembly in the initial tightening of the interfaces if an adequate seal is to be maintained for a long period of time and at the required service temperature. Any reduction in this stress level directly attributable to the gasket is referred to as gasket stress relaxation or simply as relaxation.

The method described in this standard is therefore intended to assess the quality of materials and their ability to maintain the given stress as function of temperature and time.

The relaxation stress of the material is the value obtained on the calibration diagram corresponding to the difference between dial gauge readings at the end of the test and after releasing the tension in the bolt.

With the introduction of this test, other tests may not be necessary to assess the suitability of the material for temperature and pressure parameters. Therefore, the results obtained should be correlated with actual working conditions.

While preparing this standard, assistance has been derived from BS 2815 : 1973 'Compressed asbestos fibre jointing', issued by the British Standards Institution.